



The Steel-Framed House

A BETHLEHEM STEEL REPORT SHOWING HOW ARCHITECTS AND DESIGNERS
ARE MAKING IMAGINATIVE USE OF LIGHT-STEEL FRAMING IN HOUSES.

BETHLEHEM STEEL





for Strength
... Economy
... Versatility

SEE YOUR ARCHITECT—Your architect will design your house to suit your needs and your budget. He knows what materials are available in your area and how to use them for best effect. He knows, too, how to make the best use of your site. And he will supervise construction.

Your architect is completely familiar with the many advantages of steel-framed houses, and will be happy to explain them to you.

When structural steel is substituted for the wood skeleton, the bone structure of a house becomes cleaner, a *precise* expression of line and form. Because of steel's great strength it is possible to frame a house with fewer members, permitting long spans uninterrupted by columns. And the members can remain slender . . . pleasing to the eye when left exposed.

A WORD TO HOME BUILDERS AND BUYERS

Bethlehem does *not* design houses. Neither do we engage directly in fabricating or erecting steel for houses.

We *do* produce many steel products which we supply to independent steel fabricators all over the nation. These fabricators have the facilities to tailor the steel and to erect the steel according to your architect's plans. Their experience can be very helpful.

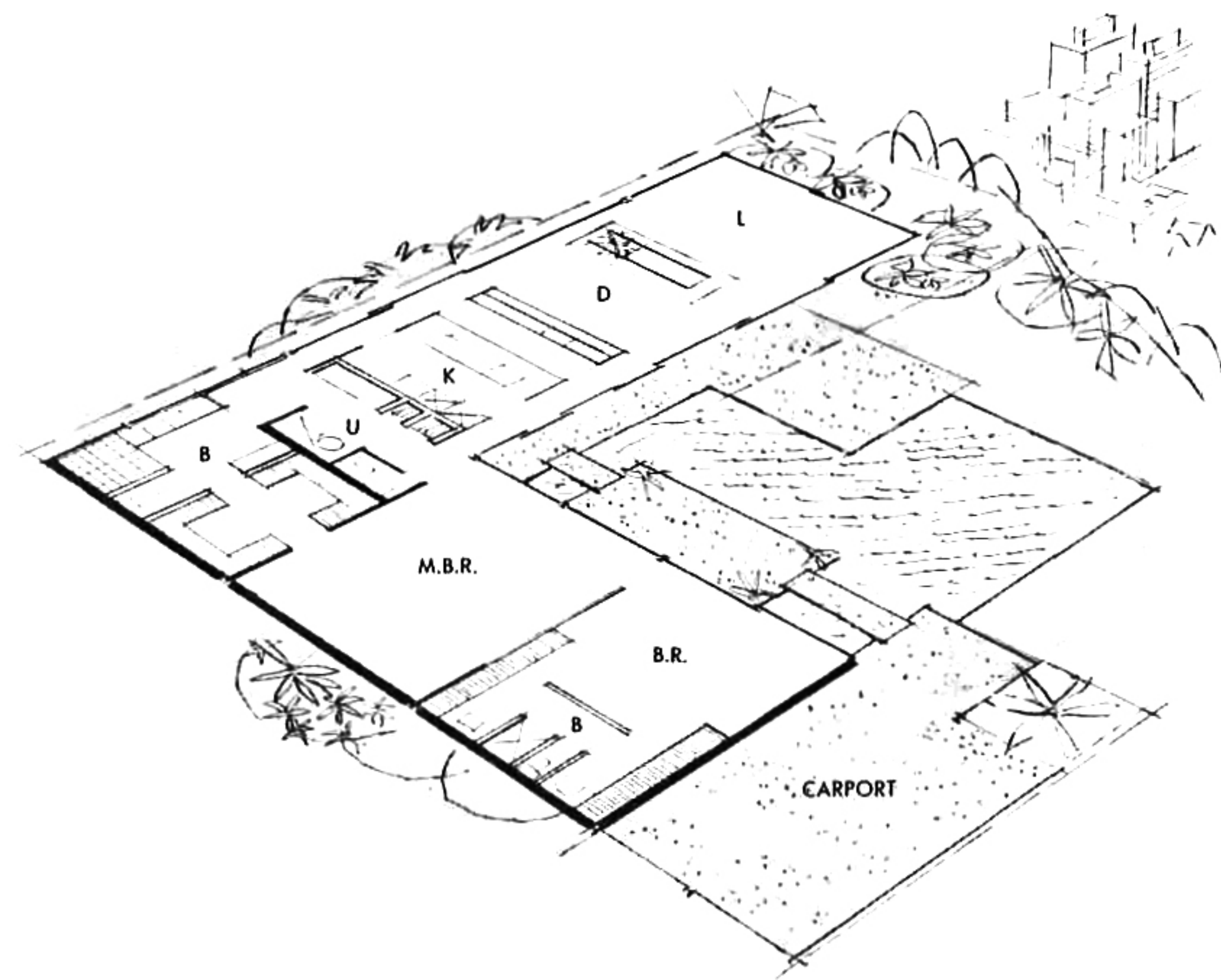
BETHLEHEM STEEL



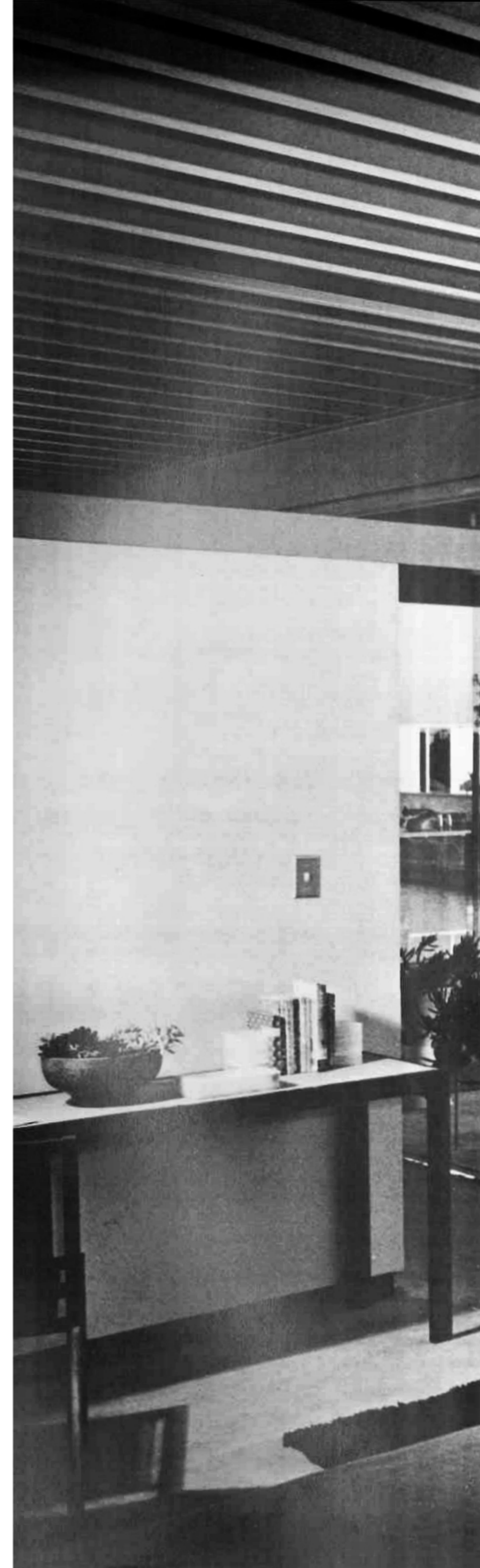
Above you see just a few of the shapes a steel-framed house can take. Steel-framed houses have been designed to suit a wide range of individual preferences. They have opened up new horizons in house design. All the houses on the following pages were framed with Bethlehem structural steel.

Freedom of Design

The limitations of other materials disappear when you design with steel. It's just right for contemporary architecture. It allows big, open areas, 30, 40 or more feet wide without any interior supports whatsoever. Steel framing also permits flexible interiors, often with movable partitions instead of fixed walls. Steel-framed houses can easily be expanded to meet future family needs, too. And you can design generous overhangs outside for sunshade effects, for patios, or covered walkways.



Heavy lines identify solid walls for privacy. Total area under roof is about 4,000 square feet. Architect: Pierre Koenig. Structural engineering by William Porush; general contractor was Robert J. Brady; steelwork by Raymond Equipment and Welding Company. Case Study #22 sponsored by Arts & Architecture magazine.



They "papered the walls" with the view

What could be more sensible than to make this magnificent view of Los Angeles a part of the house—to "paper the walls" with it?

Slender steel bars frame and strengthen the floor-to-ceiling glass wall and door panels; slim steel columns and girders support the roof-ceiling of steel "T-decking." And note how that roof extends way out to cut heat and glare. The entire steel framework for the house went up in a single day, and was roofed over in a few more days.

An Architect's Own House

Light trusses in the shape of diamonds float over an open living area in architect Ulrich Franzen's house in Rye, N. Y.

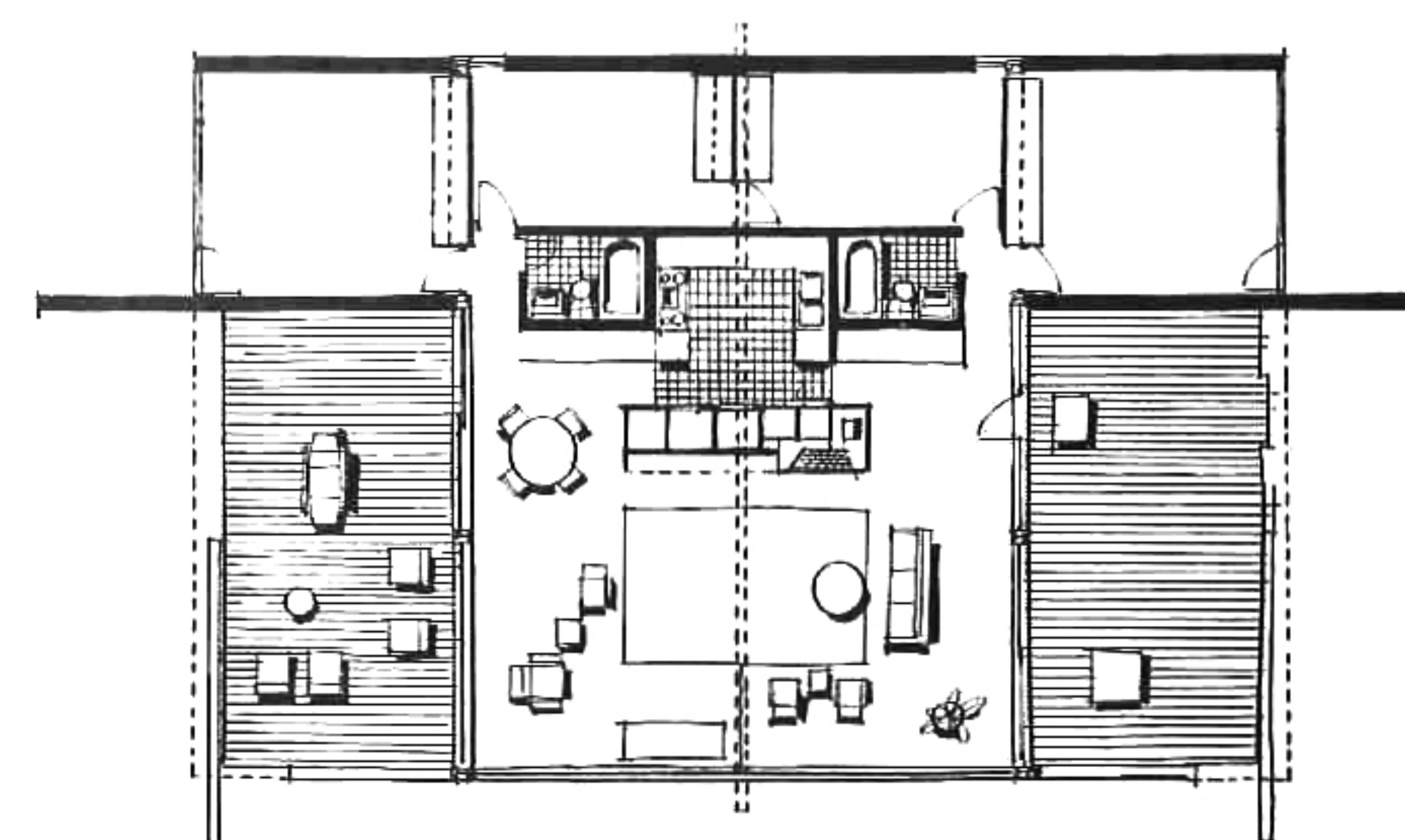
Glass curtain walls (so called because they do *not* carry weight) box in eight supporting steel columns, and expose low free-standing partitions.

Mr. Franzen says, "Our thought and practice is to use a structural steel frame of very light sections, shop-welded, and field-erected by bolting. All our frames are pre-fabricated and assembled at the site by a rigging crane and three riggers in one day or less. This is the way of steel construction."

It took just one day to erect all structural members. The light steel sections form a three-hinged arch. The diamond frames are mostly 2 x 2 x 1/2-in. angles, welded. They were easy to fabricate.



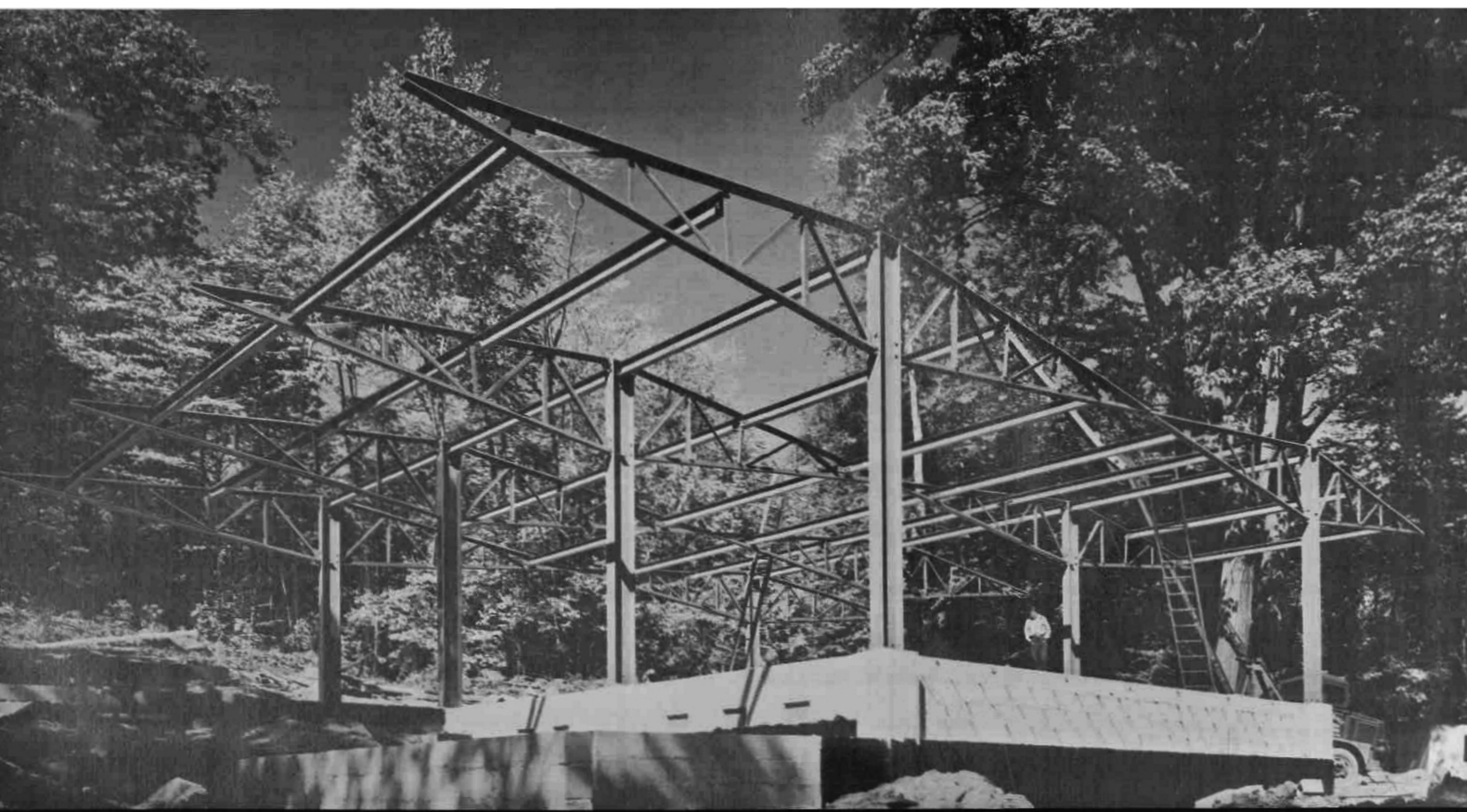
Engineering was done by Mr. Franzen's own office, which is in New York City. Contractor: Raybeck, Inc. Rye Metal Craft fabricated and erected the steel.



Despite its small size, the Franzen house provides lots of living area, including four bedrooms. The kitchen is the hub of the house. It gets plenty of daylight over the low partitions and storage walls, and from the long, narrow skylight bisecting the ceiling. From here, activity in any part of the house (the Franzens have three children) can be easily supervised.



In the living area, Mr. Franzen uses free-standing canvas panels to break the open plan of the room into several conversation areas. Sliding glass walls open to link the terraces with the living area in nice weather.



The Apple of Apple Valley's Eye

This is the Newton T. Bass house in Apple Valley, California. Steel-framed throughout, this 6,400-sq-ft luxury home is a perfect example of the rugged site solutions, of the long spans, and of the generous overhangs possible with steel framing.

A beautiful but rugged mountain top provides the site for this 4-bedroom, 4-bath house designed by Francisco Artigas, Mexico City. Contractors Bennington and Smith, instead of leveling the site, simply blasted room among the boulders for footings to be poured. Then a 5-man crew from Halsey Machine & Mfg. Co. erected the 35 tons of structural steel columns and beams in five days. Wayne W. Ivans was the civil engineer.

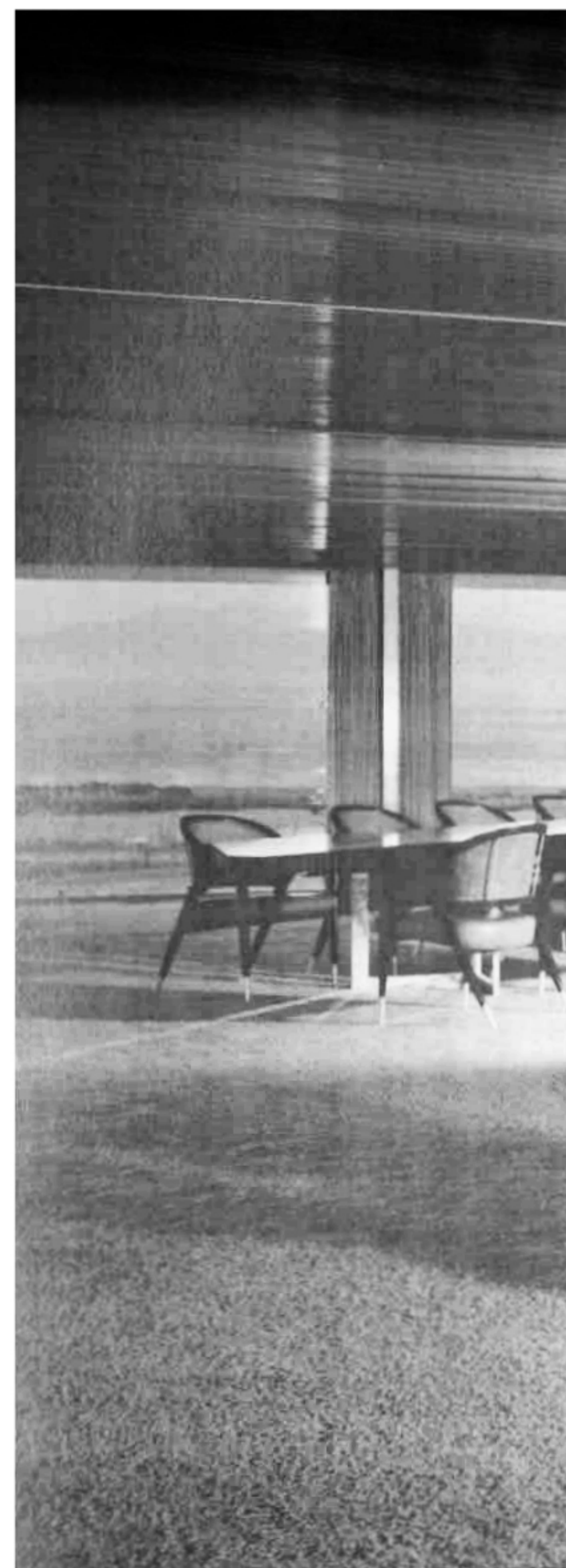
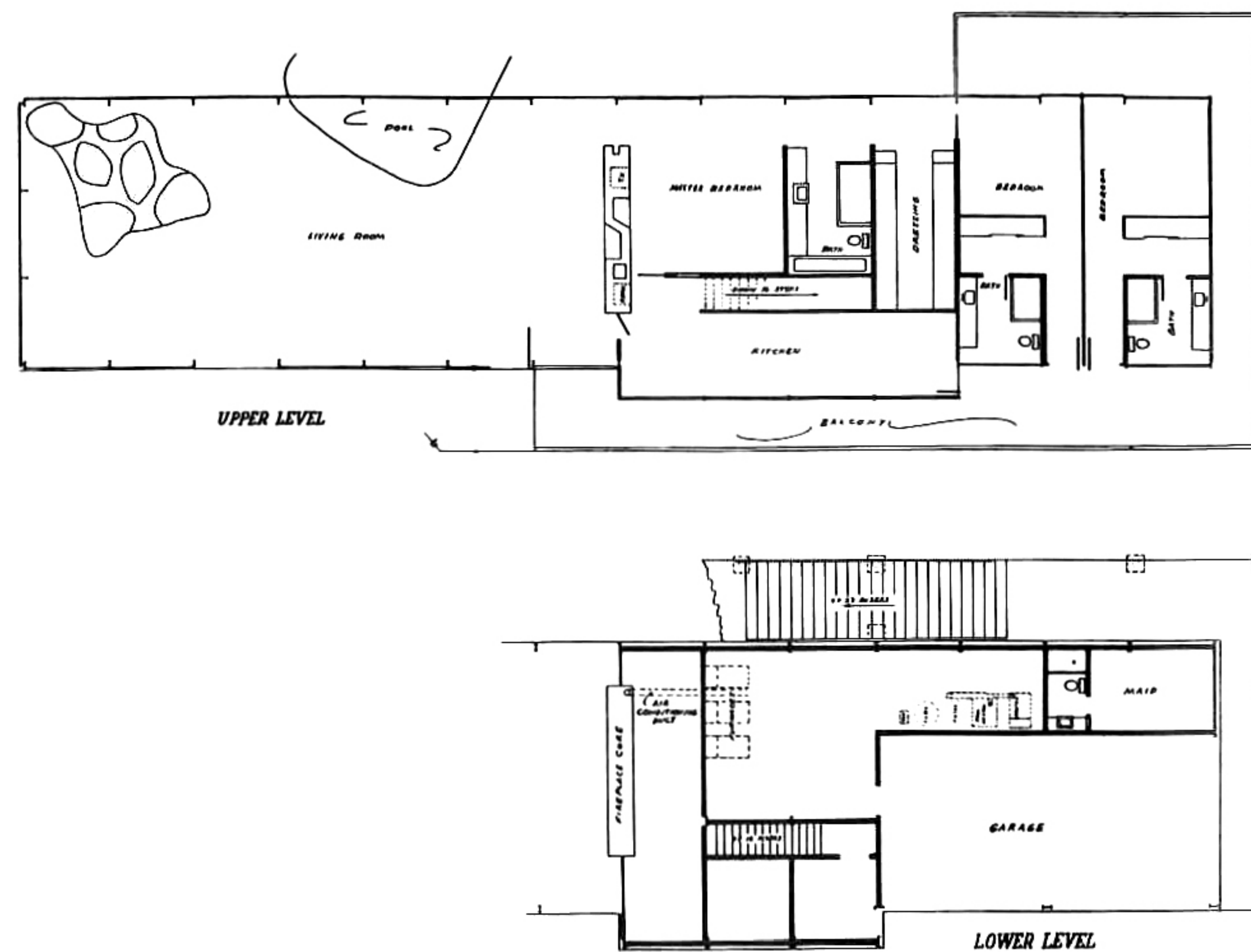


Continuous steel beams, 50-feet long, permit 10-foot-wide overhangs on each side of the 30-foot wide house. These overhangs shade the glass walls and protect the pool. Overhangs at the ends of the house are 6 feet.



Steel ceiling beams, which are continuous across the 30-foot width of the living room, were left exposed and painted frosty white to contrast in color and texture with the dark mahogany ceiling. Note open skylights at left which provide natural light for the living room. At the push of a button, these panels slide back to provide a weather-tight seal.

At the far end of the 70-foot-long living room, the rock of the mountain top juts up through the floor and supports a 20-foot-long table. Note how draperies nestle into steel columns.



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Master bedroom, directly off living room, also features exposed and painted steel ceiling beams.

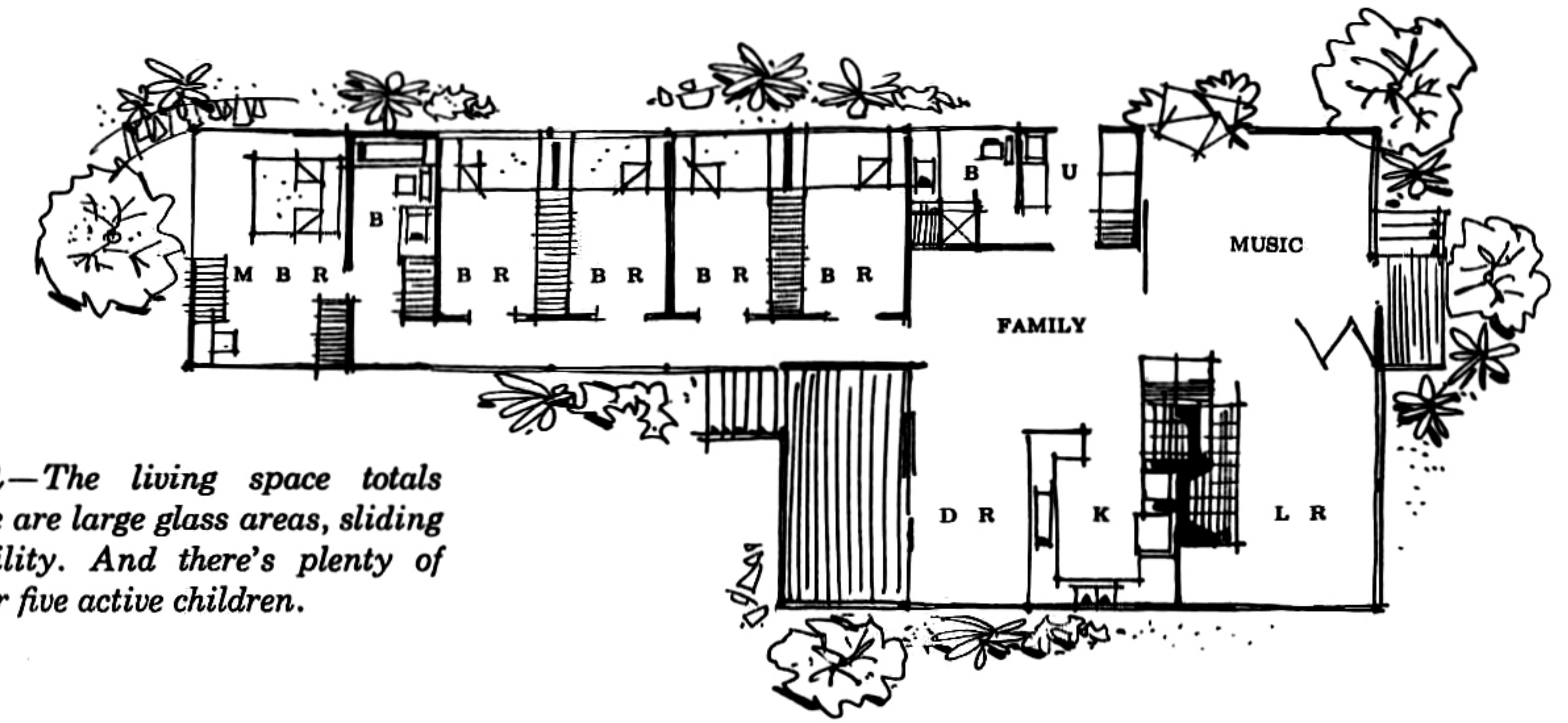


Glass block, which lets in natural light during the daytime, roofs both the kitchen and master bath. Lights between the block and the white glass ceiling panels provide nighttime illumination.





***Steel Fingers** — Three 16-in. and two 18-in. steel beams form a continuous rigid frame. The beams are welded to plates anchored to concrete piers. The fabricator welded angle brackets every 8 ft for bolting the 6 x 14-in. floor joists. The bedroom wing cantilevers out 16 ft, the living room and kitchen, 8 ft.*



***Floor Plan**—The living space totals 3,000 sq ft. There are large glass areas, sliding doors for flexibility. And there's plenty of running room for five active children.*

Dave Brubeck and His Tree House

The home of Dave Brubeck, jazz pianist extraordinary, is, like his music, imaginative, bold in concept. Moreover, it answers the functional requirements of the owners, and the problems of a perplexing site.

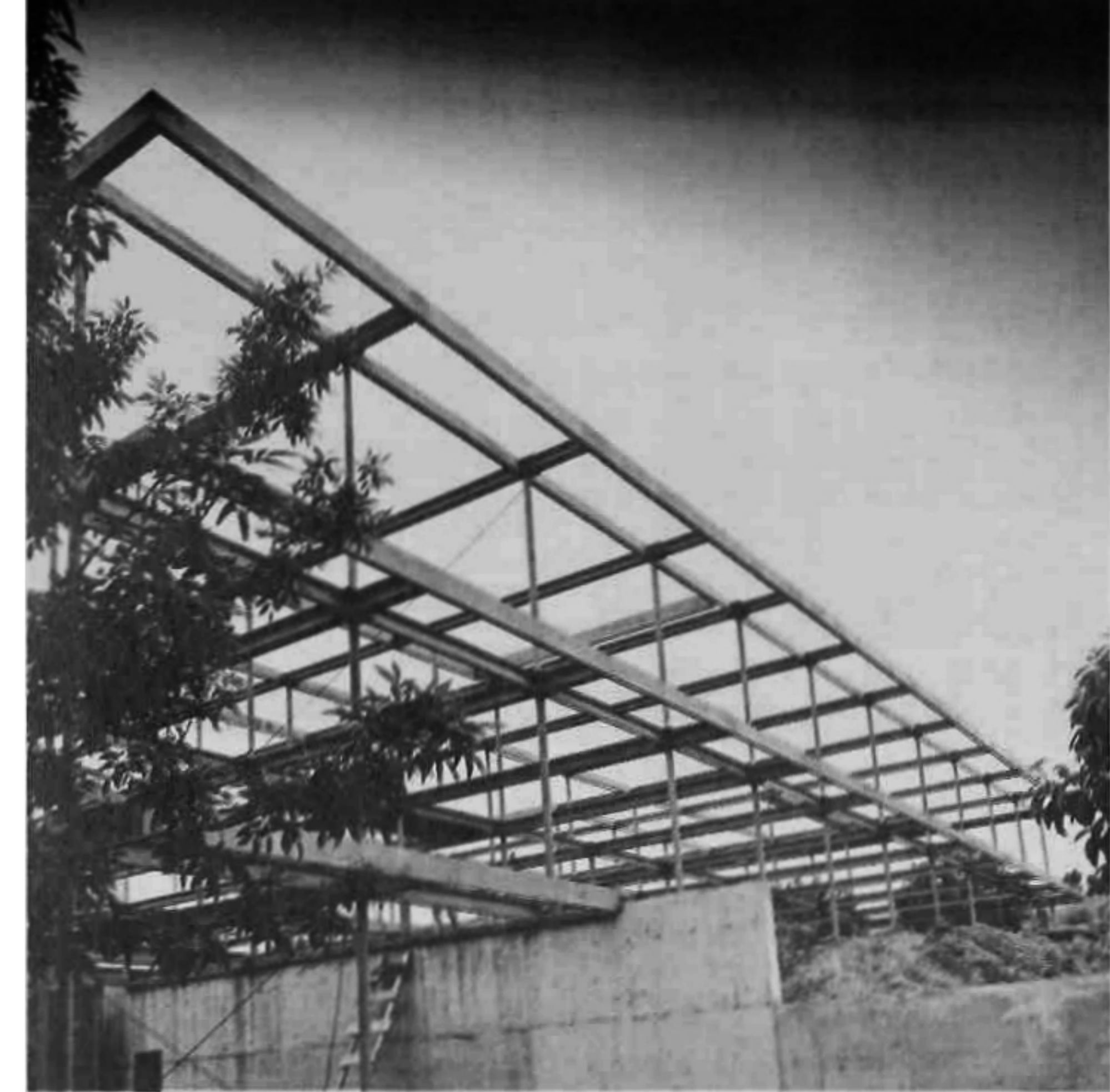
The lot itself is beautiful, with tall trees and a magnificent view of the Bay. But it's also narrow (50 x 100), steeply sloped, and virtually all rock. Here Brubeck wanted to build a home for a large family without marring the site's natural beauty.

Architect David Thorne had the answer. He formed a sort of "hand" by anchoring five steel "fingers" to a mass of rock. These beams cantilever in two directions, creating a 3,000-sq-ft level floor for the entire living area.

Thus Thorne preserved the site, leaving trees and boulders intact. The structure appears to spring from solid rock, yet its spectacular cantilever seems to soar, giving a "tree-house" effect.



Architect: David Thorne, Berkeley; Structural Engineer: Carl Replogle, Oakland; Steelwork: National Iron Works, Alameda.



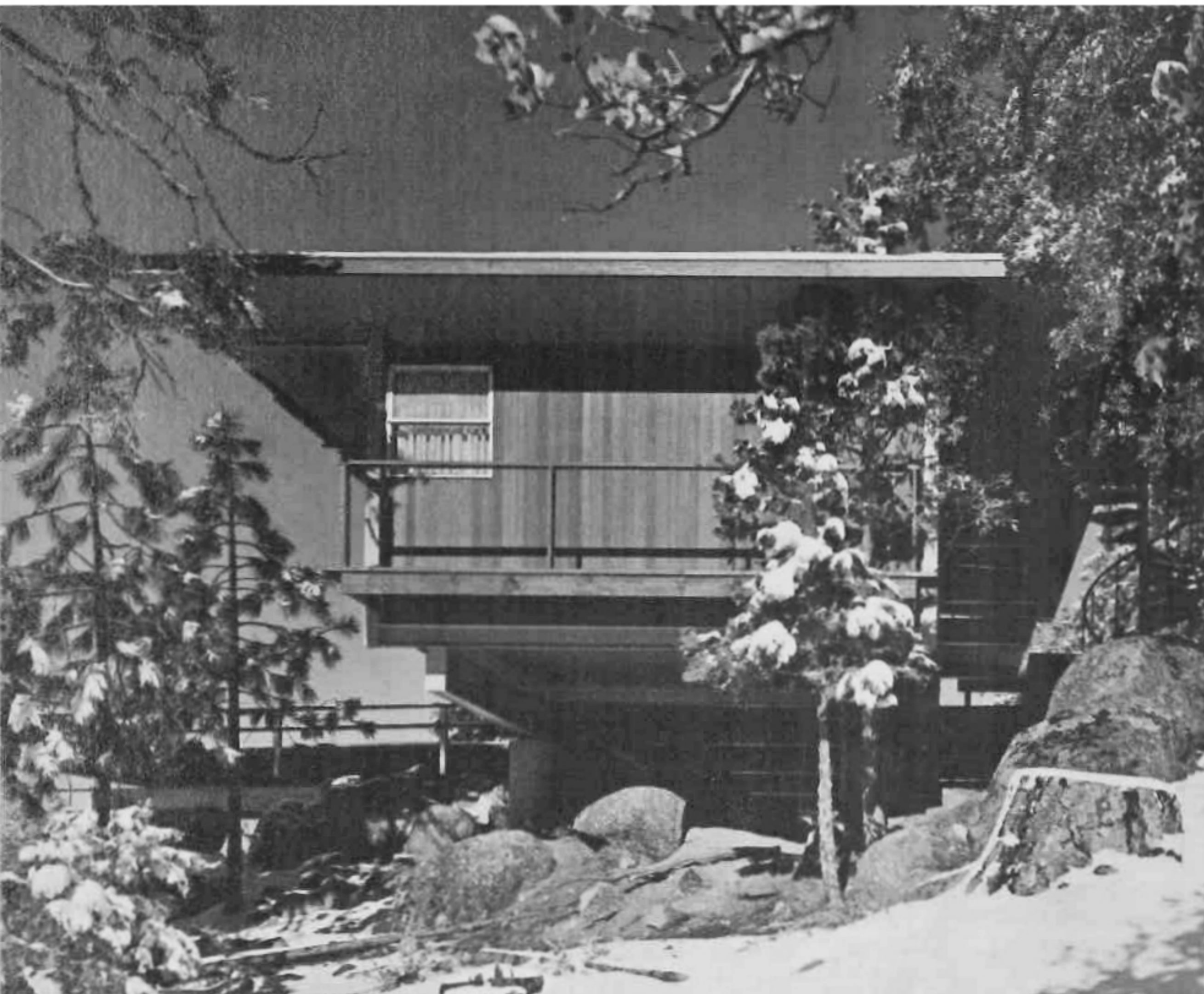
Luxury Apartments on Economy-Size Lot

This elegant apartment stands out, sleek, airy, and colorful in a clutter of conventional buildings in downtown Los Angeles.

The architect, Raphael S. Soriano, made the most of the small lot, only 125 by 100 ft, and dropping 13 ft in grade from west to east. He designed a two-story, all-welded steel frame, consisting of 6- and 8-in. I-beams on 3-in. standard pipe columns. Modules are 10 ft by 20 ft, and 10 ft by 16 ft. Cost of the 41-ton steel frame ran only \$.83 per sq ft of floor area.

The structure includes nine 1-bedroom units, two studios, twelve carports, and a penthouse equal in area to four apartments for the owner. All the apartments are bright, sumptuously appointed, and boast small but sunny gardens or patios. Most of the steel framework was left exposed, its bold, clean lines emphasizing its structural function.

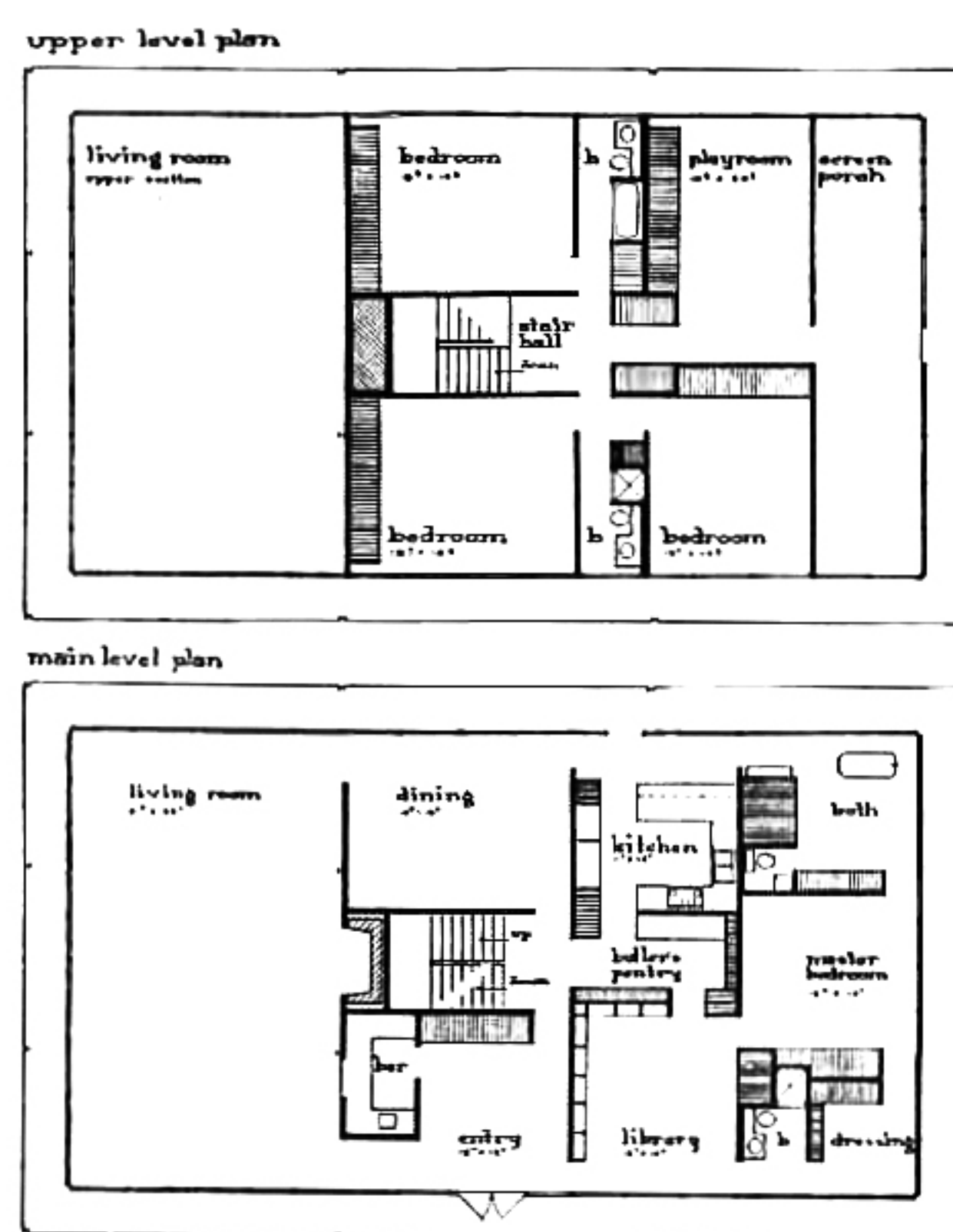




Paint steel to contrast, with itself and with the surrounding countryside, as architect David Thorne did in this mountain cabin . . . or paint steel to blend with the scenery around it, as architect Paul Hamilton did in this house which "grows" on a wooded hillside.



30 tons of structural steel, left exposed and painted gold, was fabricated and erected by PanAm Steel, Inc., Houston.



Living room, two stories high, is the "great hall" of the building. Glased-in on three sides, it is an impressive 24 ft wide, 36 ft long and 18 ft high.

"Steel is the Material of Our Age"

Here, in their own words, are five reasons why architects Bolton and Barnstone of Houston chose steel framing for this elegant house.

1. "The steel was cheaper than wood, in that very large wood sections would have been required because of the large spans, and because of the possible 'twist' of the structure, in the event of settlement or excess wind load."
2. "Structural columns in steel can be thin and delicate. The house is very much the personality of the owners—a sophisticated refinement of detail and proportion."
3. "Steel resists decay and rot. In the Gulf bayou country every known wood material

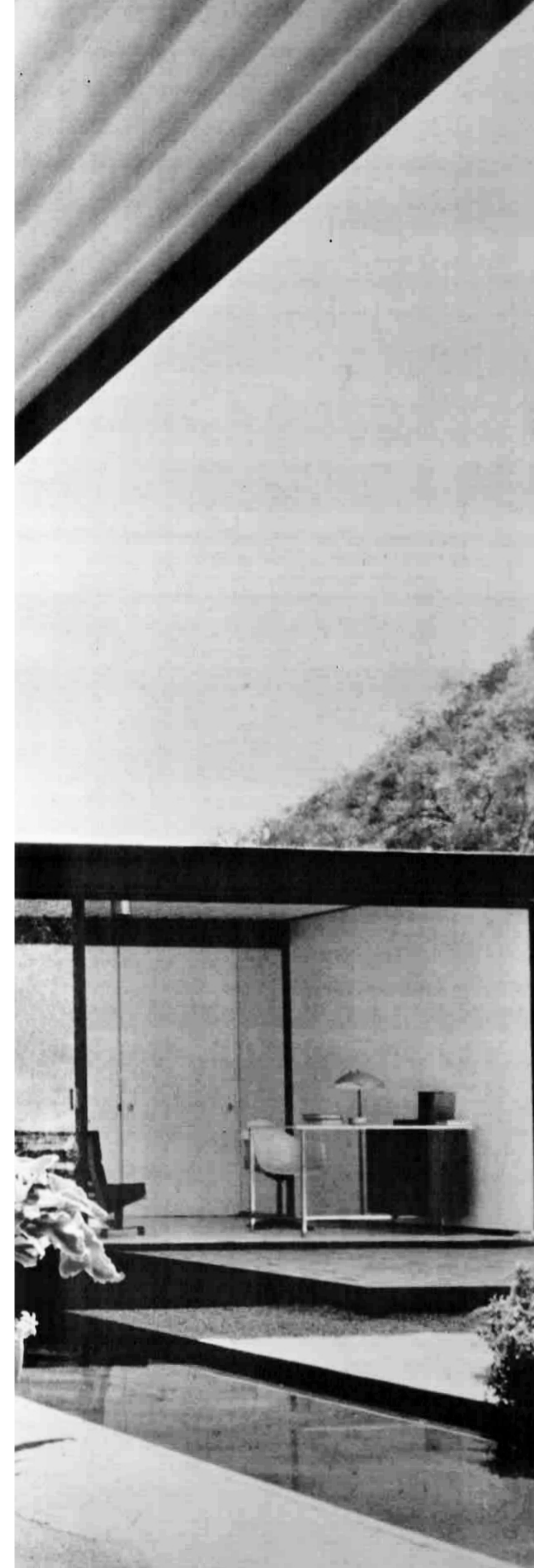
eventually succumbs to the war of the termite and dry rot. The house is set down in the valley of the bayou to insure privacy from the street. This increases the tendency to rot and bug decay, because of the nearby water, and the humidity in the hollow."

4. "Steel is the material of our age—the true expression of a highly mechanized, advanced society. What material can one find with so much integral and closely packed molecular strength? What material in which there is so little chance of failure as a result of a defect in the material?"

5. "Steel made this house beautiful."



View from carport with study-bedroom at right. The master bedroom is beyond it. The house was a case study project of Arts & Architecture. Architect: Pierre Koenig. Structural engineer: William Porush. General contractor: Pat Hamilton. Steelwork: Lee and Daniel.



A portion of the living room, with cooking-dining area beyond the room divider.

A House Designed for Indoor-Outdoor Living

Glass walls bring the outdoors in, while sliding doors open onto brick terraces bordering shallow pools of water.

All this was made possible by steel. The entire house is framed with structural steel, allowing big expanses of glass, eliminating the usual clutter of posts and walls. Overhead, formed-steel decking spans from beam to beam, while steel walls give privacy where desired.

The cost, despite the home's many luxurious appointments, was well in line with conventional materials.



A Cluster of Steel “Umbrellas”

It stands on the crest of a hill in Connecticut, overlooking the Essex River and Long Island Sound. And a remarkable house it is. The “living” area is an elegant pavilion, 40 ft square, with floor-to-ceiling glass walls. The view is magnificent.

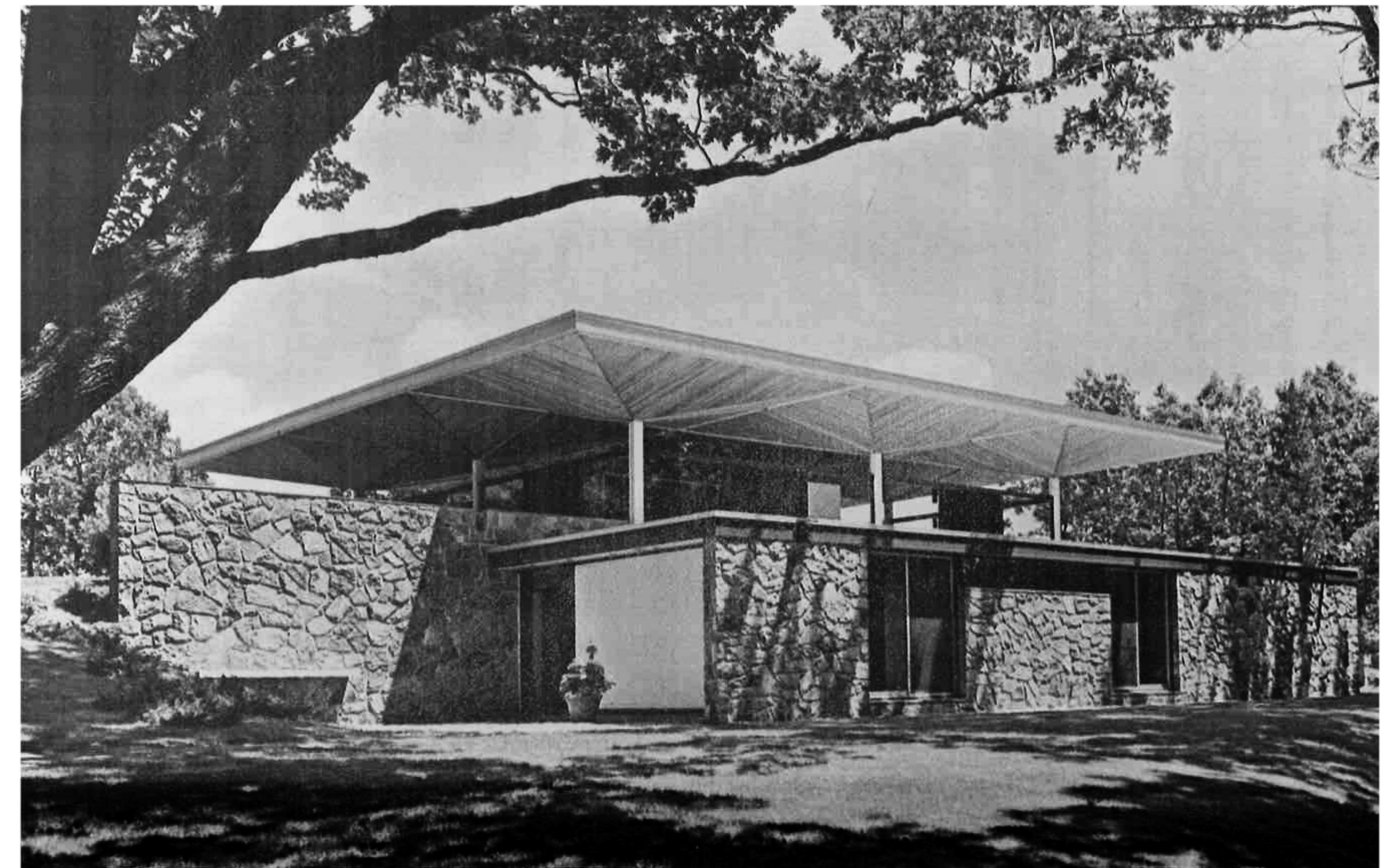
But the most dramatic element is the roof, which seems to float on air. It consists of nine steel “umbrellas,” each supported on a single steel column, and sheathed with wood. In addition to avoiding any inside walls, this design provides a ten-foot overhang to shield the glass walls from sun and rain.

The three bedrooms and two baths, laundry, utility and storage rooms, and the main entrance, are on a lower level cut into the hillside.

It’s significant that the steel framing amounted to only seven per cent of the home’s total cost!



Architect: Ulrich Franzen; Steel fabricator: Thames Valley Steel Corp.

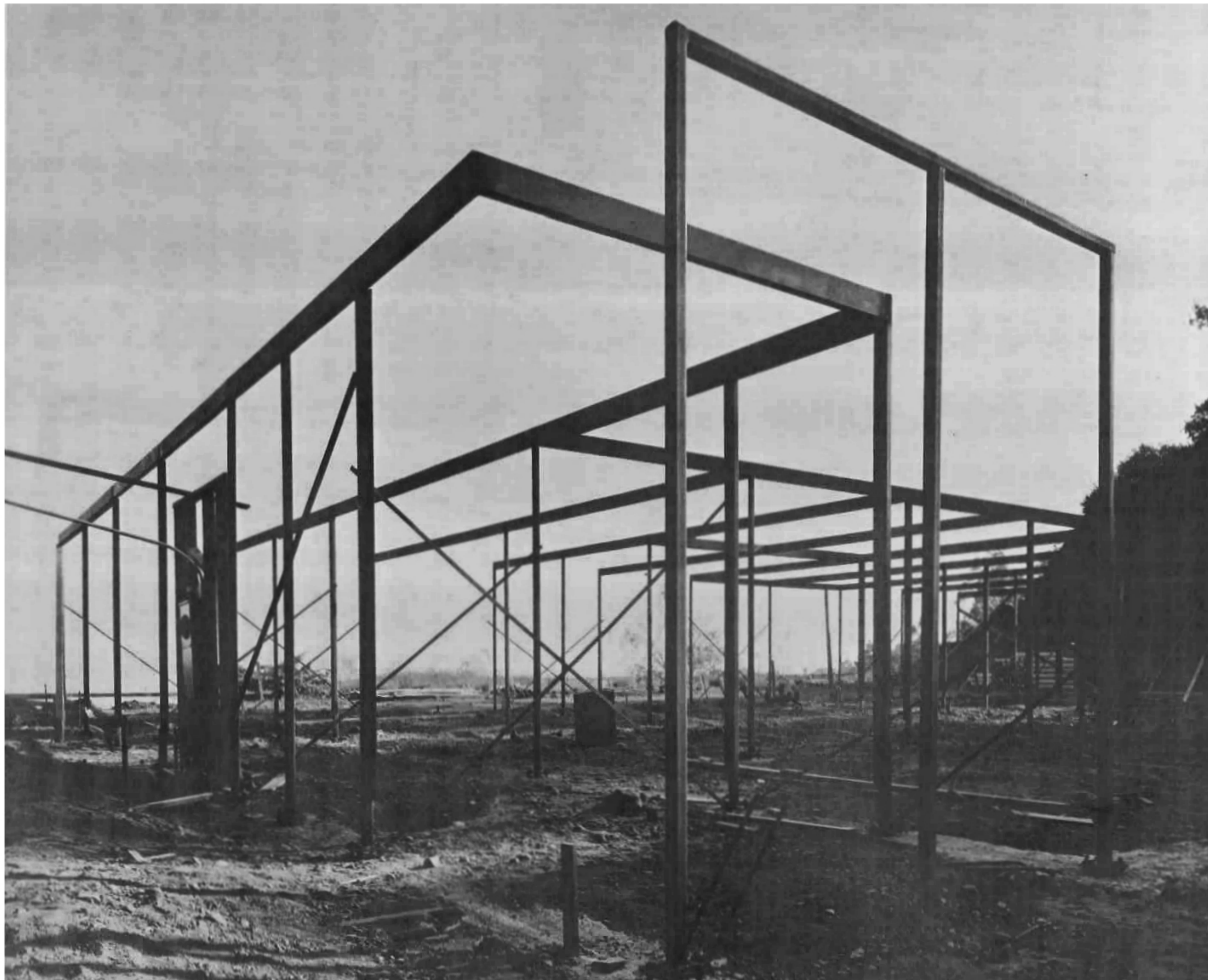




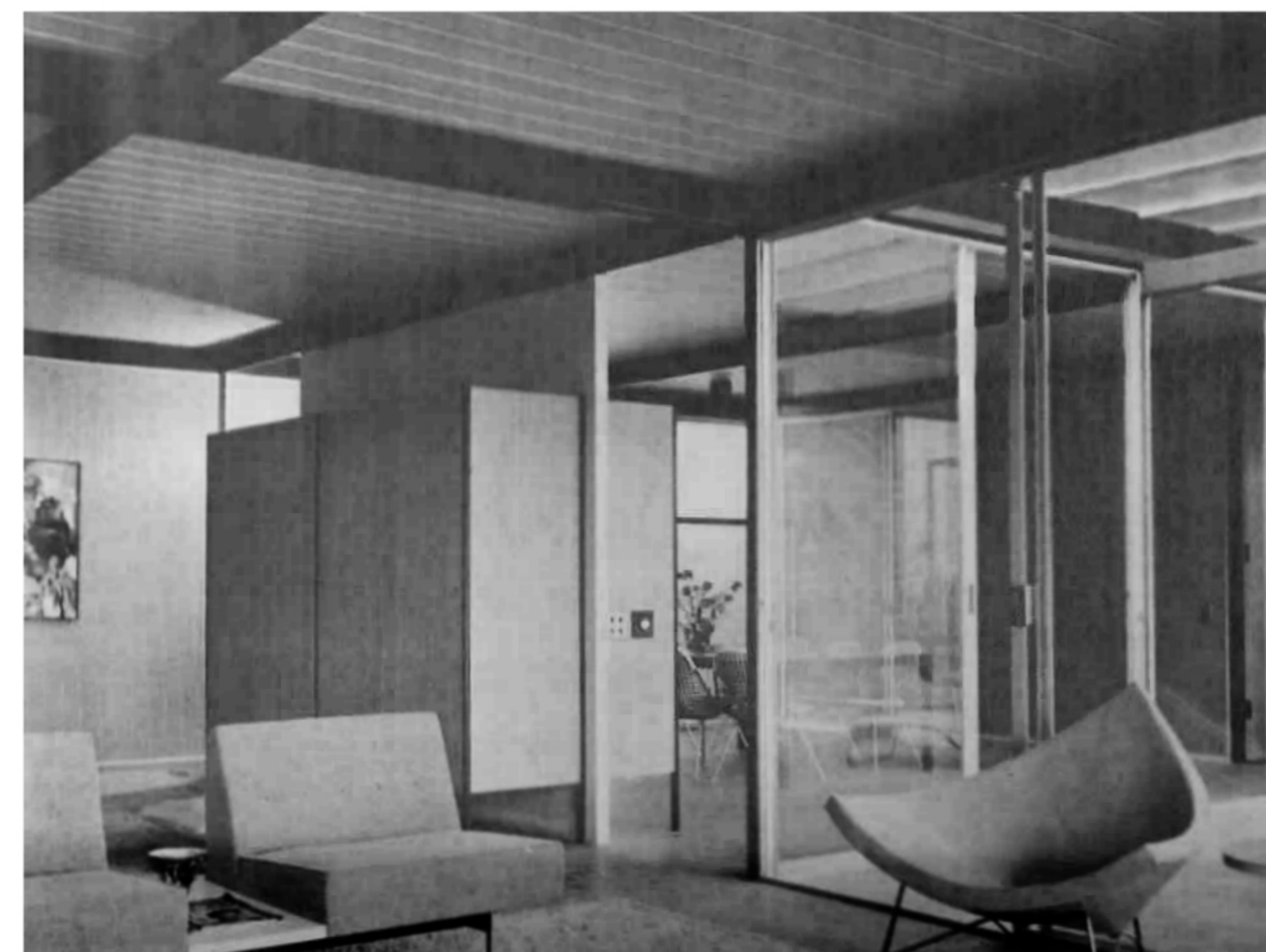
This experimental house by Craig Ellwood Associates, Los Angeles designers, points up what Mr. Ellwood believes to be the key to mass-produced houses . . . the development of a modular structural frame to carry all loads. According to Ellwood, "The segregation of structure from walls provides a design flexibility not otherwise possible, and sets no limitations as to the selection of wall panel material. Metal, wood, plastic, or glass panels may be used with equal ease."

This house was a case study project of *Arts & Architecture* magazine.

An Experiment in Steel



Steel framework of hollow steel tubing was shop fabricated by Houlberg Iron Inc. and erected by four men in eight hours. Each 16-foot bent was shipped to the job site in one piece. All field connections were welded. Structural Engineers: Mackintosh & Mackintosh. Contractor: P. E. Philbrick Co. Builders.



Extensive use of glass panels (above and below) gives a feeling of depth to bedroom and living room areas. Interior partitions throughout the house are non-bearing and "float" between rigid-steel framework. Steelwork is left exposed in ceiling covered by 1½-inch interlocking steel decking.



The 1,200-sq-ft house has two bedrooms, living-dining room, bath, and kitchen. A sundeck extends 40 ft from the house on steel beams. Steelwork: Pittsburgh-Des Moines Steel Company, and National Iron Works.

All-Season Mountain House

Like an eagle's nest, it perches on a rocky, wooded point 4,200 ft above San Joaquin Valley in California. But this "nest" is there to stay, because it's completely framed with steel, and anchored to solid rock.

The steel frame permits the lavish use of glass, making the interior bright and cheer-

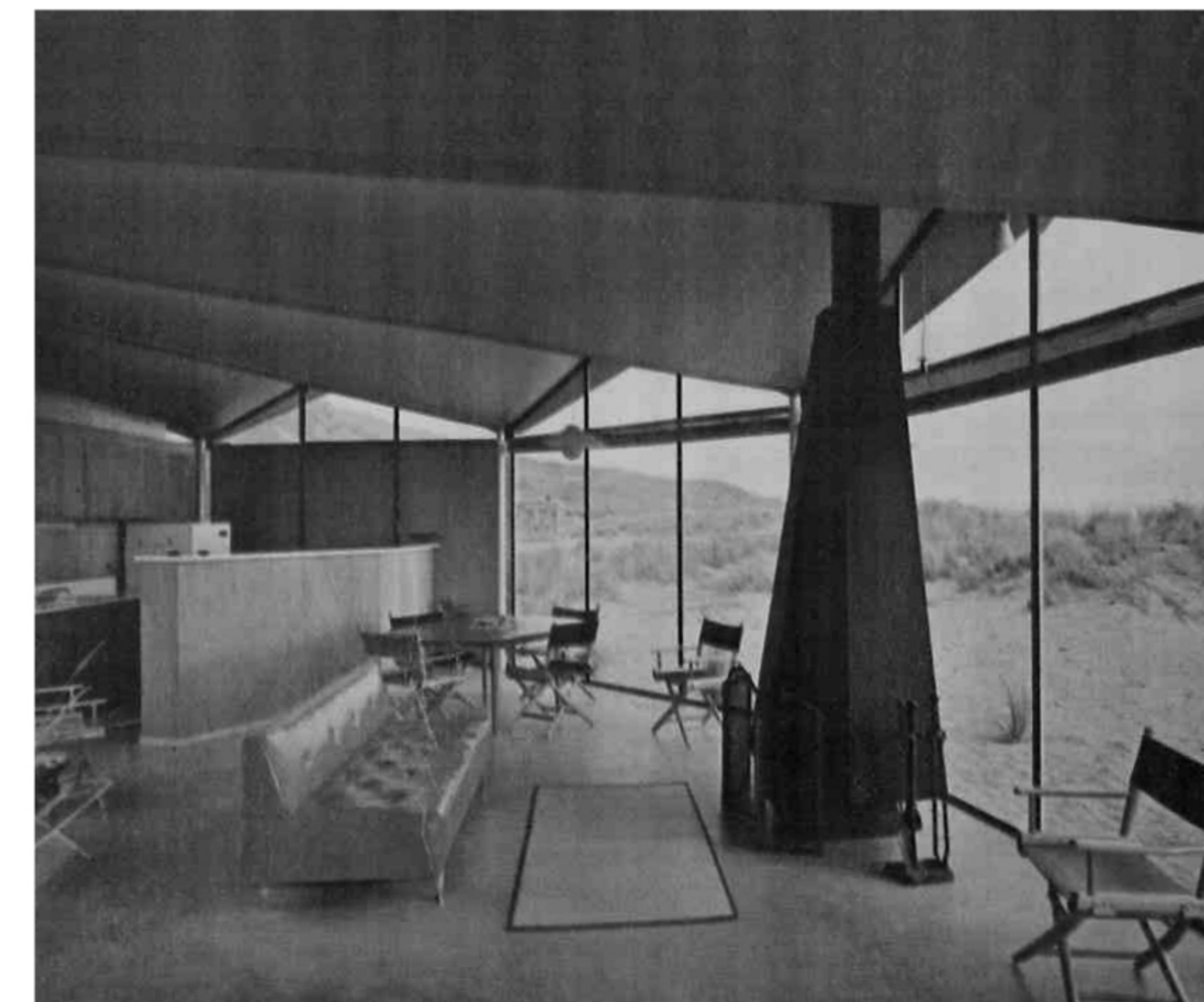
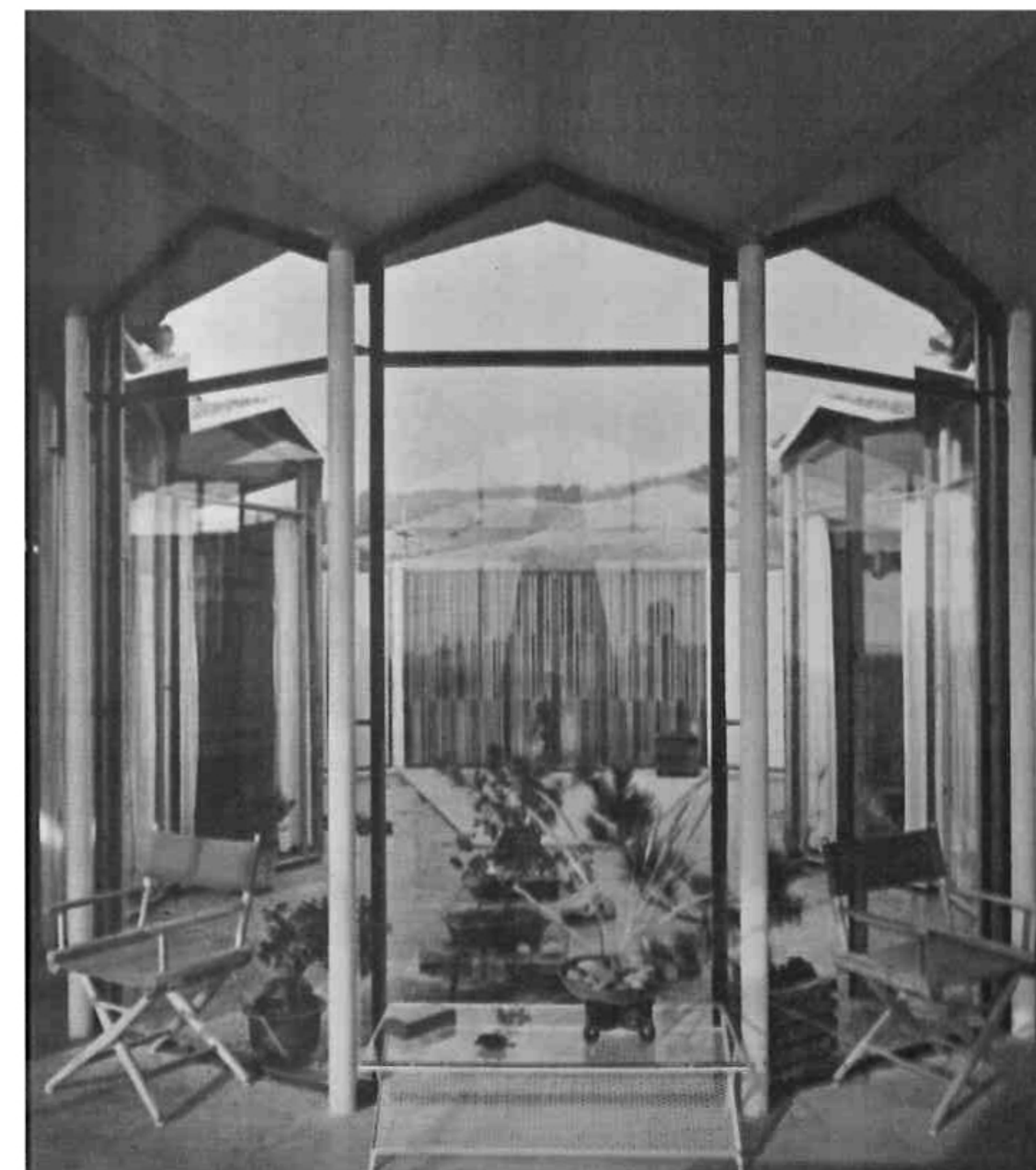
ful . . . letting the owners enjoy the changing beauty of nature all around them.

The house was designed by architect David Thorne, of Berkeley. Steel is a logical choice for contemporary design. It combines with other materials—as shown here—to achieve a variety of pleasing effects.

Beach House

And what a house for enjoying the out-of-doors! Architect Jock McKay designed it with huge window-walls, a sheltered court for sunning, and a unique "folded-plate" roof. Let the wild winds blow—this house is framed with *steel*. Costly? Not at all. The same design in conventional stud-wall construction would have cost much more!

The twelve-sided house contains a spacious living room, three bedrooms, two baths, kitchen, utility area, and enclosed court. Steelwork by Lambrich & Son, San Rafael.





A City House Framed with Steel



This building in Boston's Back Bay area was constructed on a 25-ft wide vacant lot. Because of the existence of the party walls of the two adjacent brownstones, it was not necessary to construct any sidewalls. By erecting two steel-framed glass walls, front and rear, a total building was created.

Here, as in most cases, the steel was used not only for its structural ability, but its decorative attributes as well. The steel entrance stairs and all steel framing members and hangers are exposed and painted contrasting colors.

Architect William Krokyn, of the architectural firm of Krokyn & Krokyn, says, "None of the property owners on the street has raised any objection to the building's contemporary design."



Steel-framed window wall is set back from the adjacent brownstones and is almost constantly in shadow. Obscure glass in the bedrooms, front and back, plus normal curtaining eliminates visual disturbances. American Architectural Iron Co. fabricated and erected the steel. ►





The framing system consists of a series of rigid steel bents, 8 ft-8-in. on centers, bolted to footings. The bents are composed of 10 WF 11.5 beams welded to 3-in. standard pipe columns, and extending 4 ft beyond the columns to support the roof overhang for shade. Interior spans are as much as 24 ft. In the living room only, the beams are grouted in a masonry wall on one side.

With this one exception, both interior and exterior walls are non-load bearing and consist of light materials including large expanses of glass. Ceilings are the underside of steel roof decking, painted to contrast with the charcoal-painted steel beams.

The architect also took good advantage of a steep slope to the rear of the lot. With a minimum of excavation, he provided a 24 by 52-ft play area open on one side. Steel beams resting on block retaining walls span the area. Over these is steel decking topped with poured concrete. This, in turn, becomes the floor slab for the bedroom-kitchen wing.

Even the carport of the Elroy Chinn home utilizes structural steel. Contractor: Mutual Contracting Co.; steelwork: Busters' Welding Co.



The exposed steel beams and roof decking complement the Tahitian decor of the Chinn's family room. The decking is roofed with insulation and conventional built-up roofing.



A room for active boys, with plenty of natural daylight, but shielded from the hot sun by a 4-ft overhang.

A 2,900-Sq-Ft House At Just \$8.97 Per Foot *

This handsome home in Honolulu has ample room for a family of seven, yet was surprisingly economical to build.

The entire house was framed with structural steel for reasons well stated by architect George Mock of San Francisco: "In preliminary conferences with consulting engineer Donald T. Lo of Honolulu, we decided on steel instead of conventional framing because of steel's ability to span greater distances, its dimensional stability, and most important of all, its permanent immunity to termites."

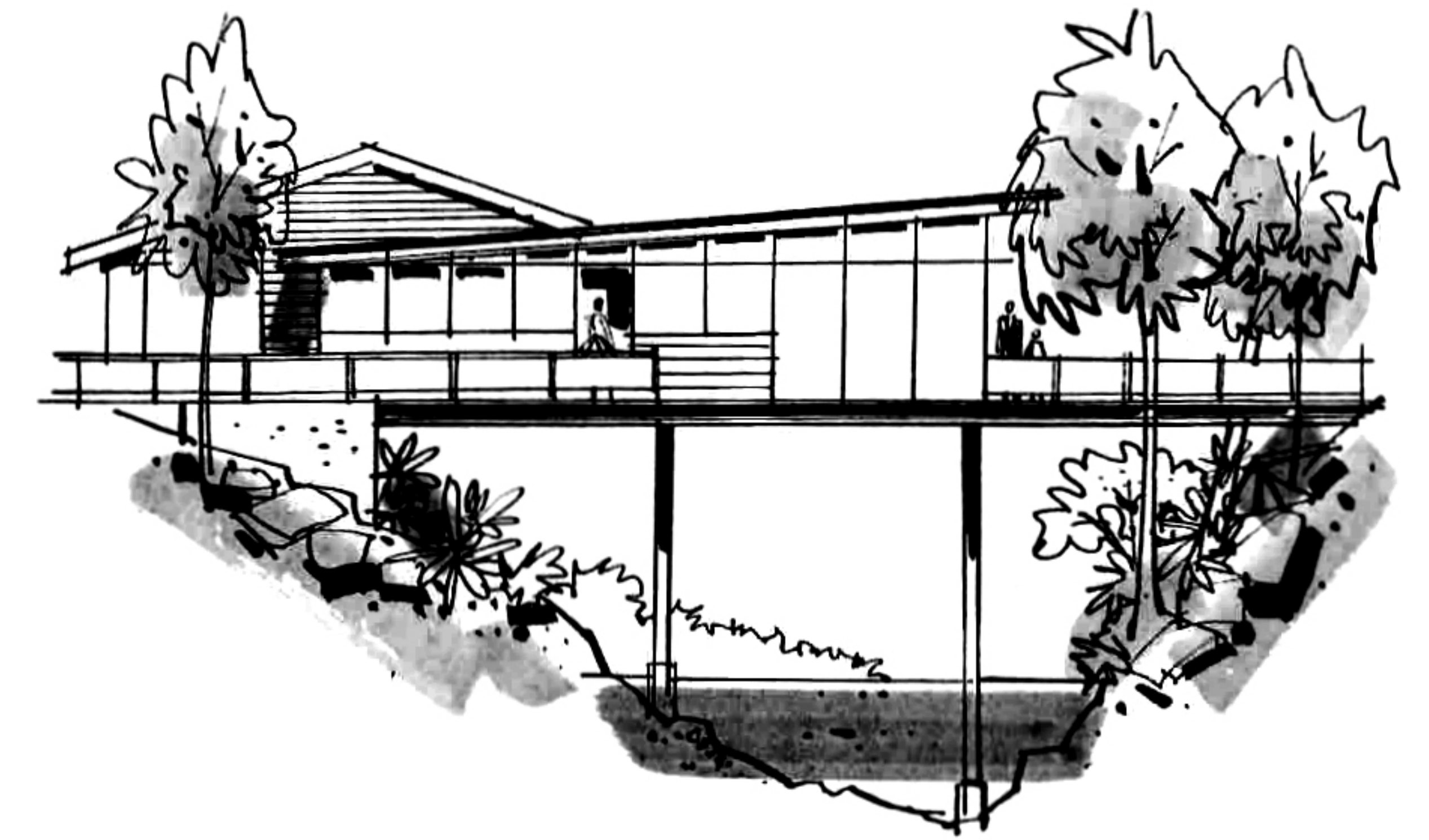
**The basement brings total footage to 3,100 sq ft. The cost of this additional space was less than \$7 per sq ft.*



This steel-framed house perches on a sheer cliff overlooking the California shoreline. Steel framing permits cantilevered deck area and glass walls along the entire length of the house. Hooded overhang, also cantilevered, provides shade and cuts down glare.



To take advantage of a beautiful view, they built this house right across a ravine! On steel stilts, of course. Steel framing solves such difficult site problems fast. The frameworks for all the houses shown on these two pages went up in a couple of days.



Except for the 4-inch steel columns placed every 20 feet, the owners of this house high atop the Hollywood Hills have an unbroken view of 200 square miles. Big steel overhangs give spaciousness to this modest-size house.

Problem Sites? *Not with steel framing!*

With steel you can build on the side of a steep hill, or on top of rock formations. You can even build *over* the terrain—elevating the house on steel stilts. This makes “impossible” sites usable. And such lots can often be bought at bargain prices. What’s more, they save on grading. And if the “problem” site is rugged but attractive, its natural beauty needn’t be bulldozed away. Save the trees, the shrubs, the rocks.

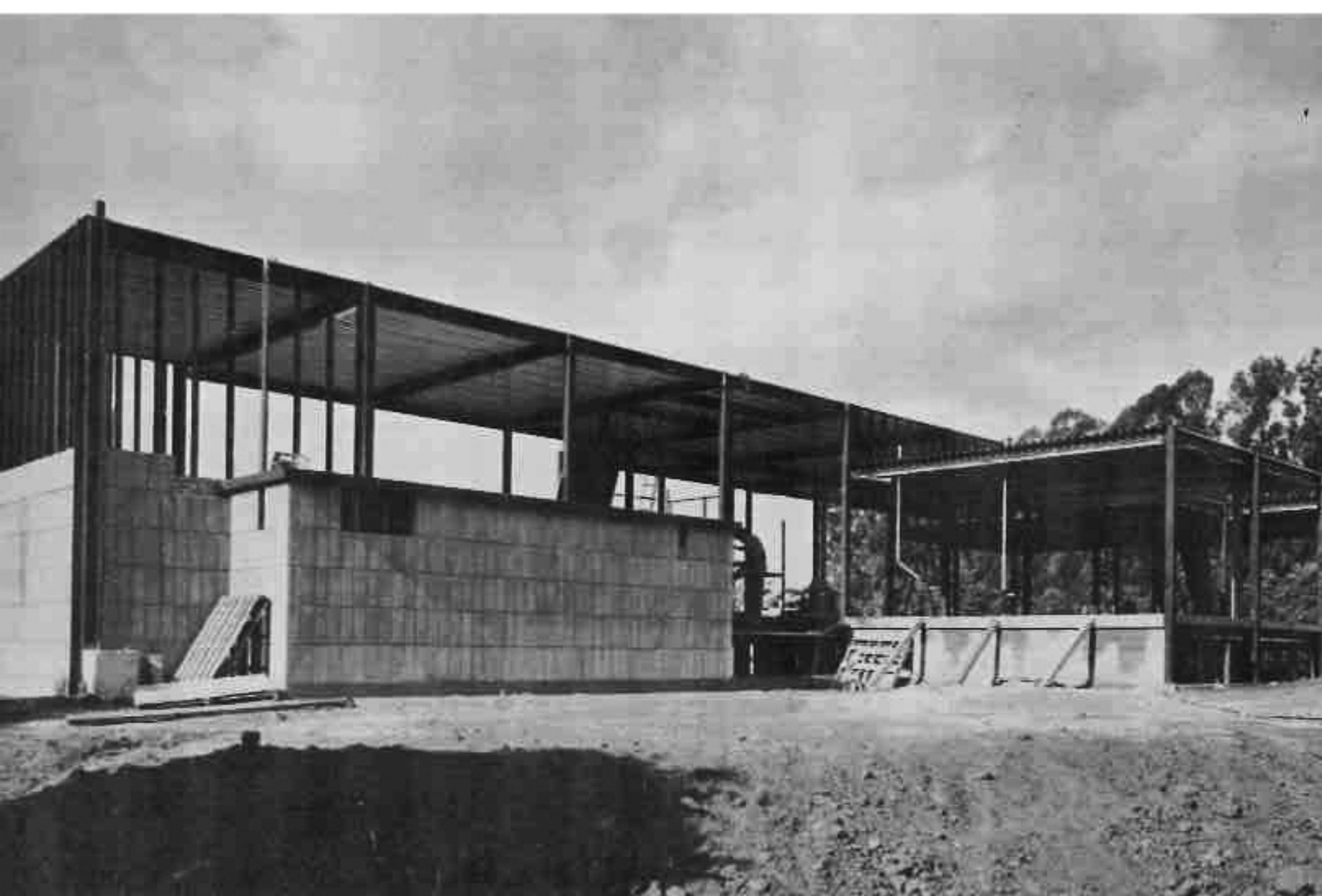
Sturdy steel frameworks, erected atop steel piling, create a street-level platform on which a two-story house was constructed. The upper level, at grade, rests atop the steel platform. The lower level is actually framed within the steel. ►



Summing Up...



UNCLUTTERED INTERIORS . . . Steel's great strength allows you to span long distances with no need for interior columns; it helps keep interiors flexible. And it permits generous overhangs outside.



QUICK COMPLETION . . . A fabricating shop can prepare the steel in a few days; most likely the entire frame can be put up in a matter of hours and quickly roofed over. Compare that with the many days needed for a carpenter-built house!



PERMANENCE . . . Steel framing is strong, virtually indestructible. It won't shrink, warp, sag or rot. It won't burn. Termites hate it.



CURTAIN WALLS . . . Huge glass panels and sliding glass doors can be placed between steel columns to bring the outdoors in. If you prefer opaque wall materials, use porcelain-enameled steel, plastics, wood, brick, or stone.

ECONOMY . . . With "problem" sites, steel commonly saves money. But even on level lots, a steel-framed house need not cost a penny more than any other house. They have been built for as little as \$8 to \$10 a square foot.



WHO WOULD LIKE LIVING IN A STEEL-FRAMED HOUSE ?
Tastes vary, of course. But anyone who likes crisp, contemporary design . . . who likes outdoor-indoor living is sure to find a steel-framed house his cup of tea.

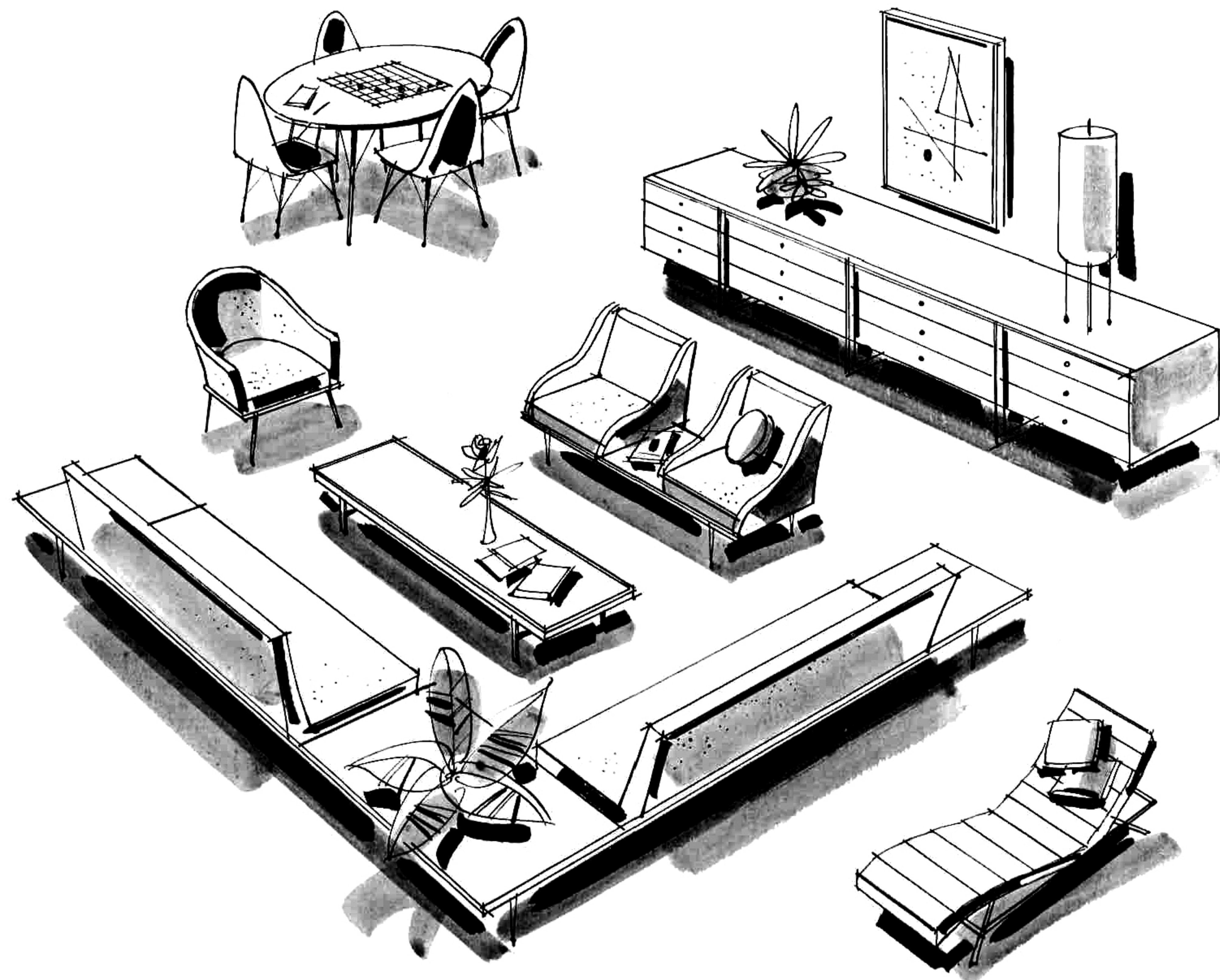
High Style in Steel

The most elegant homes are graced with furniture fabricated from steel bars, steel sheets, and steel wire.

Sturdy steel furniture has long been popular in the garden and on the porch, as well as in business and professional offices.

Today's artistic creations of furniture manufacturers have brought high style to steel furniture, with the result that it enjoys wide use in every room of the home.

Some designs are modern, with clean, flowing lines. Others are richly ornamented adaptations of traditional designs. All are as fashionable, and as comfortable, as they are functional.



Tapered steel beams, painted green to blend with the surroundings, will last a lifetime. So will the elegant wrought-steel furniture, which is made largely from steel bars.

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